

# SOIL CONSERVATION

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## *Introductory Statement*

WITHIN the Department of Agriculture there are a number of agencies administering land-use programs. There are programs for the control of erosion, for general agricultural conservation, for rehabilitation of disadvantaged farmers, for improvement of the tenure situation, for promotion of farm forestry, for retirement of submarginal lands from cultivation, and for flood control. All of these programs, and others, treat on land use. But each program points toward a common goal.

When the programs of the Department reach the farm they merge and become one program. This is essential. In the leading article in this issue, the first of two dealing with all of the Department's land-use programs, Secretary Wallace points out how the various parts intermesh, like the gears in an automobile, when the farm is reached. How this may be done with the least friction, with (to carry the simile further) the least grinding of gears, has been the subject of constant deliberation of State and Federal officials. One outcome of such deliberation is the proposal for a coordinated planning set-up for the counties, the States, the regions, and, finally, the country as a whole.

In this issue are gathered together between two covers definite, concise statements of the parts the various bureaus play in the over-all land-use program of the Department. SOIL CONSERVATION in opening its pages to these discussions is making a very real contribution to a better understanding of the Department's work and objectives; for our hope for success depends largely on our ability to reach agreement. If the Department's program is to go forward we must achieve a practical agreement on basic facts, we must be able to interpret these facts correctly, and in the light of these facts be able to determine desirable objectives and priorities; and then make the best possible adaptation of national programs to varying local conditions.

The factual background on work now under way, which is presented in this and the next issue of the magazine, should stimulate much thought and discussion, not only about the present activities of the Department but also about the steps which we must take to achieve improvement.

M. S. EISENHOWER,  
Coordinator of Land Use Planning.

# Our Land-Use Programs Intermesh

By Henry A. Wallace

Secretary of Agriculture



**I**N THE field of agricultural land-use programs Congress in the last 5 years has charged the United States Department of Agriculture with many new functions. These include programs for crop adjustment; crop insurance; soil conservation; marketing agreements; tenancy reform; the rehabilitation of the disadvantaged in agriculture; the purchase and development of submarginal lands; research, demonstrations, and actual erosion control under the Soil Conservation Act of 1935; land treatment for flood control; farm forestry; the improved utilization of water facilities; and increased forestry and wildlife activities. This is only a partial list. It sufficiently indicates, however, that the Department has become virtually a new institution with a very great responsibility for vast action programs.

As an aid to the action agencies in unifying these separate programs, the Department has established an Office of Land Use Coordination, which functions intensively in Washington and helps in the coordina-

tion of activities at regional headquarters and other field points. Naturally, the Office of Land Use Coordination deals primarily with administrative and policy problems. Nevertheless, the coordination of administrative procedures in land-use planning implies the coordination of fact-finding, and of Federal action with that of State and local agencies. It may be worth while to consider some of the implications. They extend far beyond the range that the first glance might suggest. Indeed, in the last analysis the requirements of coordination in land-use planning take us beyond administration and even beyond agricultural research, and carry us deep into the relationship between country and town, and into the network of social and economic facts and forces that constitute the rural-urban balance.

First, let us glance cursorily at some of the administrative requirements. It is necessary to begin with the coordination of all the physical and economic surveys on which program planning depends. Next comes the coordination of all phases of land-use planning. Next we must undertake the coordination of actual land-use programs and policies and of water programs and policies including land treatment for flood control. There is an important opportunity to promote the unification of programs through wise organization and procedural changes. Fundamental study of all agricultural and land-use legislation is necessary, so that as far as possible we may have an integrated legal basis for required activities.

It is necessary also to coordinate this Department's land-use planning, programs, and policies with those of the Farm Credit Administration, the National Resources Board, the Department of the Interior, and other Federal agencies. For example, there is a critical situation in the upper Rio Grande watershed in New Mexico. Here a large Indian and Spanish American population may become a permanent relief burden, through the progressive destruction of soil resources. Four bureaus of this Department and four bureaus of the Department of the Interior have established a permanent interdepartmental board to deal continuously and systematically with this problem.

Among the Department's more important objectives are: (1) Stability of farm prices, farm income, and rural-urban relationships; (2) the conservation of soil, water, forests, grass, and wildlife; (3) security of ten-

ure for farmers, with an increase in the percentage of owner farmers and better conditions for tenants; (4) higher standards of rural living and stability of rural communities through integrated crop adjustment and better land use. Needless to say, these objectives do not occupy watertight compartments. They are interdependent. Progress toward one type of objective requires equal and simultaneous progress toward the other ends.

Control of wind erosion in the Dust Bowl, for example, is more than a simple problem in moisture conservation and land engineering; it is a problem also in the organization of types of farming, in the improvement and stabilization of tenure conditions, and in the selection, balancing, and adjustment of crops. Similarly, the tenure improvement and purchase programs interact with crop adjustment and conservational activities. It is easy enough to recognize this basic truth. Actually to give it practical effect, through a harmonious working combination of different programs and techniques, involves difficult and continuous administrative coordination in Washington, in the States, and in local communities.

Along with the administrative coordination must go a parallel coordination of research. In the land-use programs perhaps more than in any other branch of the Department's work the need for action lifts the specialist out of his specialty and involves him in teamwork. It obliges him to see the whole as well as the part. Our land policy draws upon the economic and social sciences as well as upon agronomy, soil science, and land engineering. In other words, it affects the land user as well as the use of land. Specialists must look beyond their fences; they must broaden the concept of their responsibility. Otherwise, they will find it impossible to integrate the different sciences properly in the action programs, and results will be small for the effort expended.

The need for taking a broad view of the land question does not shove the specialist into a back seat or in any way depreciate the value of his special knowledge. Indeed, it puts a premium on research even of the very highly specialized type. But here is a relatively new thing in the application of agricultural research. Formerly, with the discovery of a useful fact or principle, the responsibility of the research worker tapered off. He could present his results to the farmer with a take-it-or-leave-it gesture. Research was mainly individualistic and so was the application. It is different now that public agencies have great responsibilities for action. It is necessary for research agencies not only to discover what should be done but to co-

operate with farmers and with other groups in putting the discoveries into practice. Besides the research that can be applied by the individual farmers, research specialists must now develop the kind of knowledge that can only be applied collectively through public agencies and farmers' organizations. As knowledge of this kind increases, research agencies find themselves involved more and more in teamwork for its practical application.

It would be easy to multiply illustrations. In land-use planning for different regions we need a blend of many different kinds of information. Are the land units so small that they will never furnish a livelihood? Are certain public agencies promoting the relocation of farmers in areas that other agencies regard as sub-marginal? Is there a proper integration of credit policy with land-purchase or crop-readjustment programs? How far can soil-erosion control through physical procedures be effective independently of action to sustain farm incomes or improve tenure conditions? Are we seeking to control erosion through benefit payments in regions where the principal limiting factor is the farm income or the prevalence of tenancy? What about the correct priorities in land-use planning—the order in which different things should be done? It is important to tackle first things first. Without an interchange of findings among different specialists and without the coordination of research findings, we cannot know the correct priorities. Then we become involved in unnecessary delay, expense, and inefficiency.

Special research in land-use planning needs to be set in a framework of general principles. Our A. A. A. programs through the effect on soil conservation and future land use modify the other land programs powerfully. Reciprocally, the research, demonstration, and localized erosion-control work of the Soil Conservation Service influence the A. A. A. activities. Tenancy reform promotes both crop adjustment and soil conservation; it gives more farmers an interest in the longer crop adjustment pattern, and in the conservation of basic resources. Without agreement among those responsible for the different programs as to what they should all mutually promote, there is bound to be unnecessary waste and conflict of jurisdiction. Obviously, moreover, the responsibility for developing this agreement as to broad objectives belongs not to any one branch of the



work but to them all. It must be the product of coordinated research and action.

But the agricultural land-use programs must look beyond agriculture. They must consider all land uses; those that employ the city workers directly and indirectly as well as those that employ the people on the farms. Agricultural land policy cannot be bounded by the farms, ranches, and forests, or even by the rural population; it should formulate alternative programs, one for the possibility that industrial revival will shortly restore the movement of population away from the farms and toward the cities, and another for the possibility that it will not. In the first case land not suited to farming can be shifted readily, as funds and other facilities permit, to forest, recreation, and wildlife purposes. In the second case, the shifting will meet with considerable resistance, and will need to be coupled with relocation programs and with special programs for relatively noncommercial agriculture. Agriculture is not in a position to solve industry's problem; but it cannot deal with the farm land problem without reference to urban conditions.

Modern technology has a consequence of great importance to agricultural land-use programs. Side by side with the commercialization of agriculture, technology produces an opposite movement toward self-sufficing ways of rural life. This is a very curious paradox. It results from the increasing productivity of the better lands. With commercial farming constantly reducing both the acreage and the labor required to satisfy a given demand, an increasing proportion of the rural population finds itself driven into relatively noncommercial farming. In 1929 half the farms in the United States produced only about 11 percent of the commodities sold or traded and since then the commercial production of this poorer half of our farms has dropped still more. Moreover, the number of small poor farms is increasing rapidly; it jumped 500,000 between 1930 and 1935. We have an immense rural group with an insufficient incentive to participate fully in the programs for crop adjustment and soil conservation. How may land-use programs be coordinated in the two halves of the rural system? Rural rehabilitation work, already immensely significant and useful, points the way.

Either we must arrest the trend toward noncommercial farming, through the provision of more attractive urban opportunities, or we must develop special programs for it. As an alternative to farm abandonment, which might be desirable in many areas from the standpoint of conservation, we may have to develop better types of rural self-sufficiency. As on the com-

mercial farms, it will be imperative here also to harmonize the human with the land requirements. Scientific programs for housing and sanitation, more diversified production, better preparation of food, and the rural interchange of services without the use of money, may prove helpful. Such measures should promote better land use on the poorer farms just as crop adjustments and marketing agreements do on the better ones. Much noncommercial agriculture is on land that ought not to be in farms; perhaps the best cure is to increase the supply of nonfarm jobs. Thus the land problem touches the urban problem at another point.

Still another great aspect of the land problem extends beyond agriculture to our society as a whole. Every land program encounters it eventually. This is the separation that tends to develop between the ownership and the operation of land. It is a world phenomenon, which has shaped the course of history dramatically many times, and will again. As the pressure of population increases, farmers bid up the price of land and burden the agricultural industry with debt. The result is agricultural insecurity. Buyers fail to attain full ownership, tenancy increases, newcomers invade submarginal land, and disputes arise over the division of the agricultural income as between mortgagors and mortgagees and as between tenants and landlords. History reports every conceivable attempt to deal with this problem, from the mild intervention of governments in questions of rent and tenure to violent agrarian revolution. In the United States, though already 42 percent of the farmers are tenants, the difficulty is still in an early stage. Yet the Government has found it necessary to act, through measures for the raising of tenants to ownership and for the improvement of the leasing system.

These observations are strictly within the confines of the land problem, which is simply a part of our general economic and social problem. Frequently, the agricultural approach begins in particular areas of submarginal farming, of extensive tax delinquency, of overgrazing, of excessive erosion, or of reckless forest destruction. It is sometimes necessary to begin there. But such problem areas are not isolated sore spots; they are outcroppings of more general disorder in the agricultural and social system. It is vital to attack also the general land-use evils, of which the problem areas are merely the local expression. The task involves the combined action of many technical agencies, including those concerned with the soil, with farm management, with crop adjustment, with erosion and flood control, and with forestry. It brings physics,

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# Economic Objectives of the Land-Use Program

By L. C. Gray<sup>1</sup>

ALTHOUGH the ultimate purpose of the land-utilization program of the Bureau of Agricultural Economics is, to quote part of title III of the Bankhead-Jones Act from which its authority is derived, to "assist in controlling soil erosion, reforestation, preserving natural resources, mitigating floods \* \* \* and protecting the public lands, health, safety, and welfare," its methods of achieving good land use and conservation are primarily economic, the physical development of land playing a secondary part.

In almost any agricultural area in the United States where the evidences of land waste are found—soil erosion, dust storms, human poverty, and devastated forest or range—there are economic influences which have helped bring about the misuse of land. In order to meet their living expenses, taxes, and interest, farmers on submarginal land have cut over their woodlots or overgrazed the range. Submarginal land, like insecure tenure, prevents them on the one hand from practicing long-term conservation, while on the other hand it forces them to consume their capital assets of soil, trees, or grass.

The analysis of these economic problems, and the planning of the program for their solution will be discussed in a later article. In its action program the Bureau is developing land-utilization projects that will bring about a more desirable economic basis for land use, and thereby make possible the conservation and permanent use of land resources for the benefit of local communities dependent upon them. The key instrument for the achievement of this goal is the purchase of lands unsuited to cultivation, as authorized in the Bankhead-Jones law. But several different instruments, particularly those provided by State or local action, are brought into play wherever possible, in order that the broadest possible benefits may be achieved. Land-utilization projects, therefore, represent in a large number of cases, cooperative efforts on the part of both Federal and State or local agencies toward the solution of given problems of land use. A simple clarification of the problems encountered will help to explain the operation of the program.

So far as land use is concerned, there are two major problems which either singly or together lie at the heart of the economic trouble spots in our agricultural map. The first of these is the settlement of lands that

are not suited to cultivation: there are upwards of half a million farm families occupying about 86 million acres in farms that are incapable of providing an adequate livelihood through crop cultivation. Then also, an additional several hundred thousand families are living on farms that are either too small or too large for economic operation. In either case, the results are similar from the viewpoint of the community. Poor land results in depleted resources and farm poverty; this in turn breeds tax delinquency, excessive costs for local services such as roads and schools, and increased relief.

The Bureau's program has grown out of an extensive land-purchase and development program that started in 1934 under the joint sponsorship of the Federal Emergency Relief Administration, the Agricultural Adjustment Administration, and several other Federal agencies both in and outside of the Department of Agriculture. A leading purpose of this program was to retire submarginal land from crop production and develop it for grazing, recreation, wildlife conservation, forestry, and other public uses. From this earlier program was drawn the experience upon which the present program is based. Authorized by title III of the Bankhead-Jones Act of 1937, the land-utilization program of the Bureau of Agricultural Economics is now focused primarily upon the rehabilitation of distressed agricultural areas. The purchase of submarginal lands, and cooperation with State and local governments in action that is within their sphere, are governed by this objective.

Within the broad outlines of the Nation's land problem areas, the specific location of the Bureau's land-use projects is determined in part by the extent of local cooperation offered in the development of desirable land-use practices. State and county zoning programs, organization of cooperative grazing associations or soil-conservation districts, and the development of effective State programs for handling tax-reverted land are among the leading directional measures which can supplement the purchase of submarginal land in problem areas.

During the present year, the major emphasis in the land-utilization program has been placed on the Great Plains, because of the pressing need for rehabilitation in that region. Consequently, the program of land utilization has gone farther in that region and more

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effective results may be seen there than in other parts of the United States.

Throughout the Great Plains region, wherever wind erosion with impoverishment of farmers and the disruption of local public finances has been severe, large numbers of operators are usually encountered who are either living on land that is unsuited to crop production, or on units too small for economic operation as stock ranches. In the serious problem areas, restoration of the grass cover on land that will not support crops is necessary in order to conserve the soil itself. The development of stock ranching, in combination with limited cultivation of feed crops, is generally the type of land use which natural conditions indicate as desirable. Projects of the Bureau's land-utilization program combine the purchase of certain tracts unsuited to cultivation with the application of local measures designed to achieve the pattern of stock ranching and feed production that is needed in any one area.

In central Montana, for example, lies a problem area of several million acres wherein dry-land farming was greatly over-expanded. As a result of widespread farm abandonment and tax delinquency, a confused and complicated pattern of ownership developed. Larger ranches were interspersed with small dry-land farms of one section or less. Private lands were intermingled with public domain, railroad grants and tax-reverted tracts. Many homesteads had been abandoned and remained idle and unprotected. Because of the lack of unified management, the carrying capacity of the range had decreased from one-quarter to one-half of its former capacity. Private owners, either because they could not obtain control of much of the land, or because they had no means of disposing of their small dry-land holdings, were unable to solve the dilemma.

In this area, the land-utilization program first established the central Montana project in Musselshell and Petroleum Counties. Some 260,000 acres of land unsuited to farming were purchased as the first step in developing a large range that could be managed constructively for the use of local stockmen. The land purchased consisted primarily of these three types: Small, dry-land farms owned by families who wished to move to other areas; abandoned homesteads over which no satisfactory control could be exercised without Government purchase; and selected tracts located at strategic points throughout the whole project area on which water facilities could be developed for the improvement of the range.

While plans for purchase were being developed,

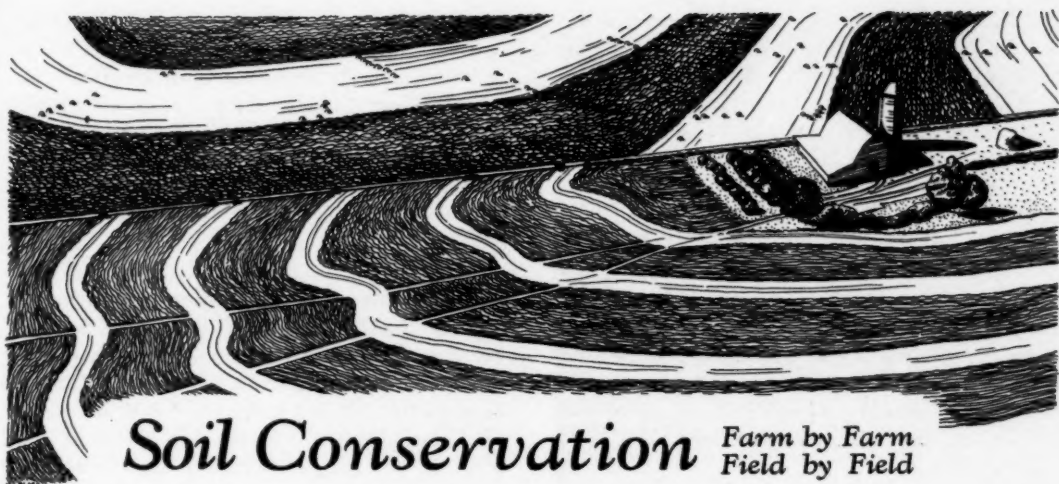
the cooperation of local stockmen in the area was sought in a joint attempt to put the range under constructive management. Through the provisions of the State grazing districts law, a means was available to develop control over much of the area without Federal purchase. Local stockmen, seeing their advantage in a program of range management, organized cooperative grazing districts under State law, and proceeded to lease privately owned land, State land and public domain in addition to tracts purchased in the land-use program. Thus, together with the purchased lands that were scattered through the project area, it became possible to place a total of more than 1,000,000 acres under constructive range management.

Following the purchase of lands in this project there came the improvement of these lands for range use through the employment of relief labor. Useless farm buildings have been obliterated and fences rearranged to suit the new pattern of management. Of primary importance has been the development of 220 stock watering places, mostly in the form of catch basins and reservoirs formed by small dams. Former cultivated fields have been reseeded to grass, while contour furrowing has aided natural revegetation by conserving water. These various developments have been accomplished by means of funds made available by the W. P. A. The entire purchased acreage has been leased to the local grazing associations for management through the operation of the Taylor (Federal) grazing district, subject to specific regulations that will ensure the conservation and proper use of the area.

During the present year the original project in central Montana has been expanded into neighboring counties. The increased scope of activity will result in the constructive management of approximately 4 million acres, of which only about 10 percent is being purchased in the submarginal land program. Because of the improvement of the range, resulting from proper management and development of new water supplies, the area should gradually be built up to a considerably higher carrying capacity than it now offers, and thereby be able to support more and larger herds.

Cooperation with other land-use and agricultural agencies is an essential part of the better land-use program of the Bureau. In most project areas, the shift toward a less intensive use of land, such as from crops to grazing or forestry, necessitates a relocation of at least some of the families from the area. This is being done through the cooperation of the Farm Security Administration as well as with the help of local

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# Soil Conservation Farm by Farm Field by Field

By H. H. Bennett<sup>1</sup>

THE use of land for agriculture is governed by a variety of social, economic, and physical considerations. Conceivably, man can temper the operation of economic and sociological forces; but he cannot change the broad lay of the land or the weather. Nature, in other words, imposes certain absolute limitations on the use of land.

The problem of soil erosion arises, basically, from man's failure or inability to adapt his use of the land to these physical limitations. This failure or inability is largely due to custom, or to economic and social pressures. But whatever the forces which impel or encourage it, use of the land without consideration of natural physical limitations is the immediate cause of soil erosion.

Ideally, complete and effective conservation of the soil would mean complete harmony between physical adaptability and land use. Realistically, however, in view of considerations other than the purely physical, such a relationship is not always possible. Instead, practical soil conservation becomes a matter of achieving the maximum degree of harmony between land adaptability and land use in the light of economic and social exigencies.

A Dust Bowl farmer, for example, may be anxious and willing to conserve his soil by farming his land in complete accord with natural limitations. But his holdings may be too small to provide an economic operating unit under best land-use practices; under pressure of debt, he may be impelled to seek profits from exploitative farming in periods of high prices; or soil blown

from adjoining land over which he has no control may be covering his fields and crops. For these, or any of a number of other reasons, he may be unable to farm as he should in order to conserve soil. In his case, economic and social pressures prevail and, as a consequence, soil conservation becomes a matter of doing the best that can be done under the circumstances. Broadly speaking, the necessity of making such concessions can be obviated only by eliminating, or mitigating, the social and economic maladjustments which now operate to impede conservation action.

Thus, in order to realize maximum effectiveness, the physical land-adjustment program of the Soil Conservation Service must be accompanied by economic and social adjustment. Efforts to bring about adjustments of this latter type on a large scale are now being made by the Soil Conservation Service and by various agencies of the Department in a synthesized national action to achieve better use of land resources. The role of the Service in bringing about better use of land must be considered, therefore, in relation to the other action programs now attempting to cope with the diverse facets of the broad problem of land use.

For the past 4 years, the Service has operated demonstration areas in representative agricultural regions to show the best methods of dealing with typical erosion problems. These areas have been described as "show windows of soil-erosion control." To them come farmers from the surrounding countryside to inspect and study the most practical methods of conserving soil and water resources. Practicability is a requirement of all measures demonstrated so that a farmer,

<sup>1</sup> Chief, Soil Conservation Service.

at least theoretically, should be able to return to his own land and install the same measures, with minor variations, according to his needs. Thousands of farmers have followed this procedure. Other thousands desire to, but find their wishes at least partially or temporarily nullified by realistic economic problems. Payments to farmers cooperating with the program of the Agricultural Adjustment Administration are helping to break down this impediment to soil conservation. Soil conservation districts, established under State laws, are also doing their part to bring about more widespread conservation of soil resources. Because of their promise as a medium for extensive spread and utilization of soil- and moisture-conservation measures, present plans of the Service call for emphasis on cooperation with these local organizations.

More than 500 soil-conservation demonstration areas now constitute proving grounds and sources of authoritative reference for erosion-control measures in 45 States. And recently a demonstration was established in Puerto Rico.

Half of the land covered by the cooperative agreements in these areas has already been protected against erosion. On the remaining acreage conservation work is being carried forward as rapidly as possible. Briefly, the agreements now in effect mean that about 3,500,000 acres in the present demonstration areas will be farmed with approved crop rotations. Some form of strip cropping will be followed on more than 1,500,000 acres. Terracing will help protect almost 2,000,000 acres. Approximately 3,000,000 acres will be tilled on the contour, instead of in erosion-inducing, straight rows, and more than 500,000 acres will be protected by seasonal cover crops. Additional thousands of acres will be protected by various other erosion-control measures.

Concurrently with the demonstration program, the Service carries on investigations and research in many aspects of the soil-erosion problem. At experiment stations located in representative agricultural regions, the effectiveness of various kinds of land cover and land treatment for prevention of needless loss of soil and water is being tested and measured. Studies are being made to establish fundamental data on the nature, causes, and effects of erosion, and to develop new and improved methods of control. Two "watershed" laboratories for soil conservation have been established to ascertain the exact effectiveness of erosion-control measures applied over a large area. At the same time, studies at these laboratories will help in determining to a greater degree of accuracy

the part which land-use measures may play in reducing the hazard of floods.

Other studies are being made to determine the relationship between erosion of the soil and costly silting of reservoirs. Climatic investigations are under way to provide a sounder basis for setting up erosion-control measures that will be more nearly 100 percent effective. No little attention is being given to the economic aspects of soil-conservation work, and in a number of other related fields, research is progressing.

Cooperatively, the Soil Conservation Service is working with the Bureau of Public Roads in the development and demonstration of highway erosion-control measures, with the Forest Service in encouraging greater care and utilization of woodlands, with the Biological Survey in establishing habitats for wildlife and encouraging an increase in the wildlife population on agricultural land, and with the Bureau of Agricultural Economics in the development of accurate economic information relative to soil conservation.

The Service also contributes to improved land use by making available to the Agricultural Adjustment Administration, the Farm Security Administration, the Indian Service and other agencies, fundamental soil-conservation information. In turn, the soil-conservation objective of the Service is furthered by the social and economic programs and benefits of these cooperating agencies.

Since it was established, the Service has operated in close cooperation with State agencies, particularly with the Extension Service and Experiment Stations. During the past year a new avenue of soil-conservation cooperation has opened—an avenue significant because of the promise it holds for speeding up the widespread adoption of conservation practices. This is the soil conservation district.

For some time it has been recognized that the soil-erosion problem of the United States could never be satisfactorily solved by Federal action alone. The task is too vast and too complex to be achieved in its entirety by a central governmental agency. While Federal agencies are needed to point the way toward better land use through technical advice and assistance, the initiative and actual work of conservation on a large part of the country's tillable land and range land must be undertaken by the farmer and rancher.

It is at once evident, however, that individual efforts to control erosion are likely to be ineffective. They can be costly and can never be anything but piecemeal. The one system of attack on erosion that promises success is the cooperative attack, beginning where erosion begins, at the crests of ridges, and work-



ing down, farm by farm and field by field, to the stream banks in the valleys below.

To speed this type of cooperative action, the soil-conservation district was designed. It is simply a mechanism whereby farmers or ranchers within a watershed, or other natural land-use area, may organize for community action and mutual protection in combatting the soil-erosion problem. During 1937, 22 States passed laws permitting local groups of farmers to organize such districts. By April 25, 1938, 39 districts had been formed in 11 of the States and several others were in the process of formation. Eventually, it is hoped, a significant portion of the Nation's erodible land will be included in similar districts.

In opening the way for establishment of soil conservation districts, each of the State laws passed to date has set up a State soil conservation committee, composed usually of the heads of various State agricultural agencies. This committee is empowered to make the legal determinations necessary in the creation of districts, to encourage the organization of districts, to bring about an exchange of information among districts, and to coordinate the several district programs of the State "so far as this may be done by advice and consultation." Once a district has been established, however, it is an independent unit, a subdivision of the State, and is not subject to control by the State soil conservation committee.

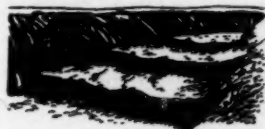
Proceeding under the leadership of two appointed and three elected supervisors, a district may decide to follow a program similar to that now being carried forward in the demonstration areas of the Soil Conservation Service. One of the first steps will probably be a conservation survey of the entire district, showing slopes, soil types, prevailing land-use practices, and existing erosion conditions. On the basis of this survey, the supervisors can draw up an erosion-control program to meet the needs of the area. They may enter into agreements with farmers and help them in developing soil-conservation plans for the individual farms. The supervisors may provide farmers of the district with technical assistance, and make loans or grants of machinery, seeds, planting stock, or other necessary supplies. In some instances, they may also offer the farmers a certain amount of financial assistance. And in furtherance of its objectives, the district may enlist the assistance of State and Federal agencies through the medium of the State soil conservation

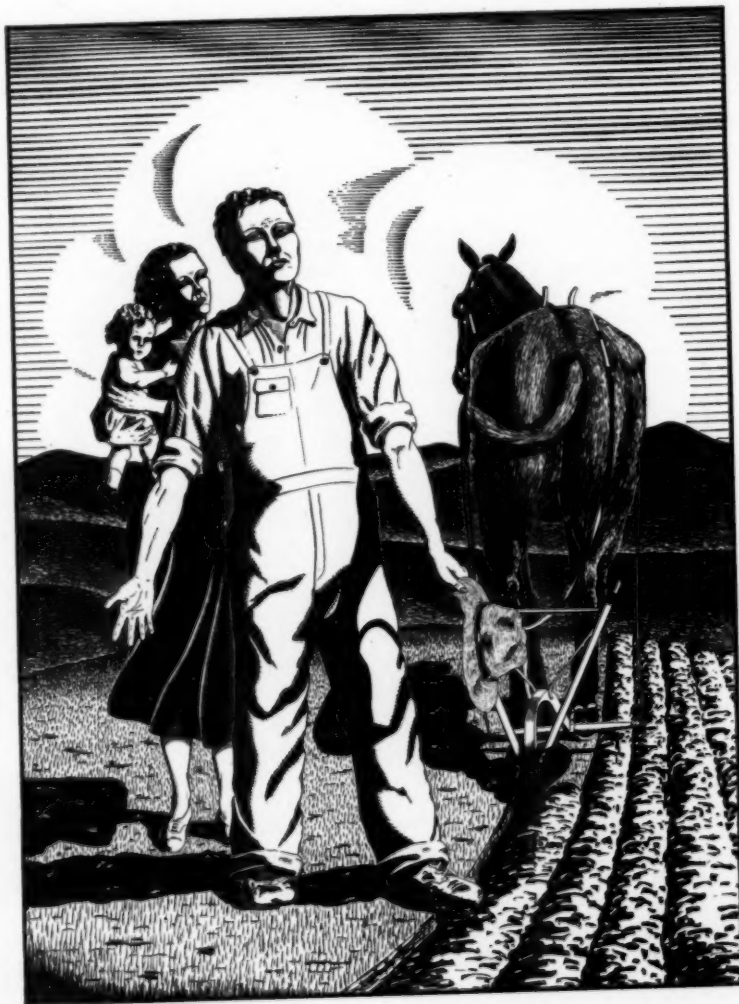
committee. To date, the Soil Conservation Service has entered into agreements with 23 districts in 6 States.

In all the work of the Service, whether it be in demonstration areas, research projects, or in cooperation with soil-conservation districts, it is recognized that the agricultural lands of the country have a wide range of possible uses. They may produce trees, grains, grasses, or any of a number of other crops. They may serve other useful functions, aside from crop production. In other words, judged purely from a physical standpoint there may be a variety of land uses which would serve equally well in conserving soil and water. In the furtherance of better land use, however, the program goes beyond strictly physical considerations. It also takes into account the important social and economic aspects involved. Recognizing that there may be several equally efficient uses for any farm or field from the standpoint of soil conservation alone, there is normally only one "best" use for that land after the introduction of vital social and economic considerations.

In an ideal program for the conservation of soil, highly erodible areas would probably be clothed with trees or grass, and cultivated crops would be restricted to the less erodible slopes and nonerodible lands. Cultivated fields would be protected by such safeguards as strip crops, terraces, and other measures. Soil-saving and soil-improving rotations would displace soil-depleting and erosion-permitting cropping systems. But social and economic factors must temper the ideal physical program, for conservation of soil is not an end in itself—it is not worth while simply because the principle of conservation seems desirable. The true value of protection for the Nation's soil and water resources is found only in the present and long-time benefits which such protection brings to all the people. The soil-conservation program is possessed of human considerations; it does not seek mere abstract, inanimate permanence of land.

From the outset, the Soil Conservation Service program has been based on the axiom that every field, and every farm should be used according to its individual needs and adaptabilities, insofar as compatible with economic and social limitations.





THE FARMER'S PLEA IS FOR ECONOMIC SECURITY

# To Conserve Farm Income and Soil Resources

By H. R. Tolley<sup>1</sup>

**B**OTH the basic and the supplementary phases of the national farm program were planned with the idea of establishing an efficient farm system which will return farmers a reasonable income and which will produce and keep on hand enough food and fiber for the Nation. The program is designed to conserve soil resources and to balance agricultural and industrial income, so that not only shall there be enough farm products, but also enough purchasing power in the hands of farmers so that they may enjoy the same standard of living as the other groups in our population.

Specifically, the current program of the Agricultural Adjustment Administration is concerned with three phases of the plan of the Federal Government to help the farmers of the country in stabilizing supplies and income and in encouraging agricultural conservation. These phases are (1) acreage allotments and soil-building goals, (2) loans on the security of stored farm products, and (3) marketing quotas for certain commodities, to be used only when supplies are excessive.

The stabilization efforts of the A. A. A. program begin with farm production. The mechanism for initial operation is the national acreage allotment for soil-depleting crops. This mechanism is designed to bring about a decrease in cropland devoted to soil-depleting crops, but not to decrease such plantings below the level required for adequate production.

The allotments represent the carefully calculated volume of farm production which will be required to establish a supply adequate to meet all requirements of domestic consumers of farm products, to supply all export markets which offer returns large enough to justify extra farm labor and the exploitation of the land, and to establish and maintain reserve supplies of farm products larger than the country has been in the habit of maintaining in the past. These reserves constitute the beginning of the ever-normal granary. They safeguard farm income and city consumer against years of crop scarcity.

The national acreage allotment for a given crop or group of crops is that acreage which, at normal yields, will produce the supply that has been described. The level of that supply, for each of five commodities (cotton, corn, wheat, tobacco, and rice), is specified in the Agricultural Adjustment Act of 1938.

This acreage, for the country as a whole, is distrib-

uted among States, counties, and individual farms. Past production records are taken into account in dividing the allotment among States and among counties. In working out acreage allotments of soil-depleting crops for individual farms—a job which is done by local and county committees of farmers elected by farmers—the size of each farm is considered and the degree of erosion, the lay of the land, and other pertinent factors.

Special acreage allotments are worked out for cotton, wheat, and rice, and for corn, peanuts, and potatoes in areas where these crops are commercially produced and marketed. In addition there is a "general soil-depleting crop acreage goal" which includes all other soil-depleting crops.

In order to qualify for benefit payments under the A. A. A. program the first thing a farmer does is to keep his plantings of soil-depleting crops within the acreage allotments that have been worked out for his farm. The result is that if yields are normal, the country as a whole produces enough to meet the requirements that have been enumerated, without wasteful overproduction or price-breaking surplus of any one of the soil-depleting cash crops.

Participation in this program is wholly voluntary. There is no penalty for overplanting. Exceeding an established soil-depleting acreage allotment means only that payments which might have been earned by staying within the allotment are reduced or forfeited.

The other part of the conservation program is based on the knowledge that the reduction of soil-depleting crop acreage alone will not conserve the soil and fulfill the purposes of the national land-use program. Conservation and improvement of the soil call for definite and positive measures.

Therefore, in addition to acreage allotments for soil-depleting crops, a "soil-building goal" is established for each individual farm. This goal can be achieved through the use of such practices as strip-cropping, contouring, planting soil-conserving crops or trees where needed, etc. In order to qualify for full benefit payments, cooperating farmers must follow practices which will achieve their goals; if they fall short of these goals, payments are reduced or forfeited. The practices through which farmers can qualify for payments are selected and approved with regard to different regions and the conditions in those regions. In the semiarid regions, conservation of water, restoration of

<sup>1</sup> Administrator, Agricultural Adjustment Administration.

depleted ranges, and means of preventing wind erosion are important.

When supplies are adequate or more than adequate to meet the current needs and to fill the ever-normal granary, commodity loans are an aid to farmers in maintaining adequate reserves in storage.

For their incomes, farmers depend on the sale of their crops. If they are hard pressed for money, as they usually are, they may be forced to sell whole crops as soon as they are harvested. Furthermore, it costs money to store farm crops such as wheat, cotton, corn, tobacco, and rice.

To prevent the emergency wherein farmers are forced, just at harvest time, to throw whole crops on a market which may be over-supplied, or to sell it to speculators who will hold it in the hope that scarcity later will force the price to a high level, the A. A. A. program provides for loans to farmers, on the security of their stored commodities. Such loans give the farmer an immediate return of at least a part of the value of his crop, and enable him to hold some of the crop in reserve to be moved to market when it is needed and when the price is fair.

Such storage supplies guarantee consumers that food, feed, and fiber crops will be available for purchase at less than scarcity prices; they guarantee farmers that they will have supplies to sell even in years when crops are short.

The loans, made through the Commodity Credit Corporation, may be made on any agricultural product, although the law directs that those on certain commodities will be subject to specified conditions. As the law prescribes, the rates and other conditions will be designed to prevent collapse of farm prices, and to facilitate the movement of crops to market when they are needed.

In addition to commodity loans, the Agricultural Adjustment Act of 1938 provides for crop insurance for wheat growers, beginning with the 1939 crop. The insurance plan calls for payment of both premiums and indemnities in actual wheat or its cash equivalent. As a result, the plan is an aid to the establishment and maintenance of reserve stocks of actual wheat, to the advantage of both producers and consumers.

While crop insurance is at present provided for wheat only, later as it is tested and developed, the plan may be extended to other crops.

Under the first step of the A. A. A. program the Government helps farmers to establish a soil-conserving and balanced production. Under the second step the Government makes commodity loans to enable

farmers to keep enough on hand for their welfare, and for the safety of consumers.

A period of several years of unusually good growing weather and high yields might build up supplies of farm products to levels above the requirements of domestic consumers, above the possibilities for exports, and above any reasonable need for reserves against scarcity. This could happen even if acreage allotments, which are figured on the basis of average yields, are observed and soil fertility is conserved. As a matter of fact, the soil-conservation features of the program will increase acre yields and the size of the crops harvested from a given acreage.

If acreage allotments are not observed, with unusually favorable growing conditions the granary will rapidly overflow. To prevent this, with flooding markets and breaking down of farm prices, income, and buying power, the Agricultural Adjustment Act of 1938 establishes marketing quotas to regulate the volume of cotton, corn, wheat, tobacco, or rice as it moves through interstate commerce channels to market.

The act specifies, for each of the commodities listed (and for no others), the levels to which supplies must rise before a marketing quota for the commodity can become effective. These supply levels are fixed at points so far above the normal requirements and the desirable reserve stocks, that reaching them would constitute a definite menace of crushing, wasteful surplus, and market collapse.

The act specifies also that when and if supplies reach such excessive levels, marketing quotas may be used. The national marketing quota represents the same amount of the crop in question as is provided by the national acreage allotment for that crop—that is, enough for domestic and export requirements and for a large carry-over.

When the supplies are at the excessive levels which the act specifies, producers of the commodity in question are asked to vote in a referendum on whether or not they approve the quota.

If two-thirds or more of the producers voting are in favor of the quota it becomes effective; otherwise it does not. In March of 1938, producers of cotton and of flue-cured, dark air-cured, and Burley tobacco voted in referendums on marketing quotas of these products. The supply of each, in sight for the marketing year 1938, has reached the levels specified in the act. In all cases, the producers voting favored the application of the quotas by majorities much larger than the required two-thirds.



When a national marketing quota for any commodity becomes effective, it is distributed among individual farms much as acreage allotments are distributed. The distribution is so made that it gives to each farmer his equitable share in the marketing of the crop just as the acreage allotment gave him his equitable share in the production of the crop.

The act prescribes penalties for each bushel or each pound of a crop marketed in excess of a farm's marketing quota. This penalty, collected through the buyer of the product and turned in to the United States treasury, amounts to 15 cents per bushel of corn or wheat, 2 cents per pound of cotton, etc.

The act provides that when a marketing quota is in effect, loans on that crop shall be made available to producers to help them carry over that portion which could not be marketed without a penalty.

It provides that should a new and larger need for the commodity develop during the marketing year for which the quota is in effect, the quotas shall be adjusted or lifted entirely and the commodity released to market.

At the end of the marketing year in which a quota is in effect, the amount of the commodity which has been carried over under the quota provisions is figured into the supply for the following year in determining the national acreage allotment. Thus if a huge surplus accumulates but is withheld from the market, the acreage allotment for that crop for the following year is correspondingly reduced.

These three steps—acreage allotments to encourage soil conservation and the production of sufficient but not wasteful surpluses, loans to help carry over reserves, and marketing quotas to prevent market collapses—make the framework of the A. A. A. program.

Additional features of the program, designed to aid in carrying out the purpose, may be mentioned briefly. One of these is the provision by which the Government may purchase burdensome surpluses of certain commodities, remove them from regular market channels, and use them for the relief of the needy and unemployed. Operations through which the Government assists in financing the diversion of certain surplus products into new uses at lower prices are proving of value in the furtherance of the plan. And, finally, two other provisions may be pointed out as contributing greatly to the program: (1) That which authorizes the establishment and maintenance of marketing agreements on some commodities to stabilize their movement to market, to avoid waste, and to obtain better returns for the growers; and, (2) that which provides for the finding and developing of new uses and markets, both domestic and export, for farm products.

## ECONOMIC OBJECTIVES OF PROGRAM

(Continued from p. 6)

agencies. Credit facilities are also needed to help achieve a better land use, particularly in the Great Plains region, that farmers may have assistance in shifting from crop production to livestock. Finally, agencies such as the Soil Conservation Service, the Forest Service, and the Biological Survey have provided technical guidance in the improvement of the purchased lands, as well as in some cases actually undertaking development work.

Much of the work of the land-use program conducted by the Bureau of Agricultural Economics necessarily has been demonstrational. This was true particularly where the need for improved land use was not paralleled by the development of local means to promote the conservation and wise use of land. In these instances land was bought in more solid holdings and was developed for public ownership and management as demonstrations in multiple-use for forestry, wildlife conservation, recreation, and pasture improvement. An example of this type of project is seen in the Clemson College land-use project in South Carolina. State agencies, under the leadership of the college, plan to take over this 23,000-acre area, consisting largely of badly depleted cotton farms, and manage it as a forest, public park, and wildlife area. Special demonstrations in pasture improvement are maintained on some of the lands.

In some of the States, notably Michigan, Minnesota, and Wisconsin, local and State programs for handling submarginal lands have been developed on a broad scale, and this makes possible an effective coordination of State and Federal land programs. In others, public understanding of land problems has not yet reached the point where effective action is possible. The demonstration projects of the Bureau's land-utilization program are being made the center of educational activities that will help to stimulate local interest and action as the basis for future cooperative endeavors.

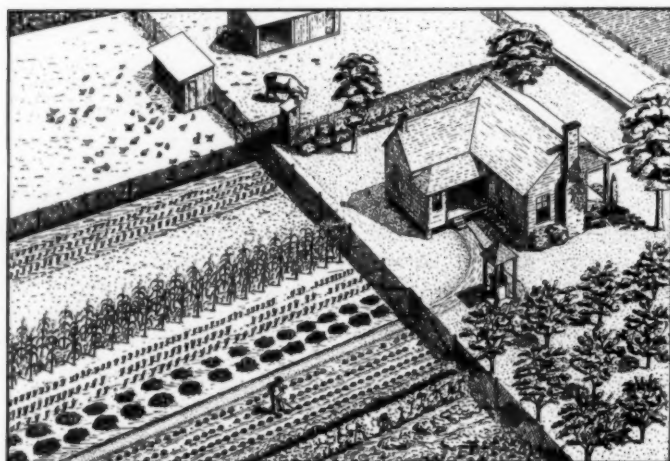
## OUR LAND-USE PROGRAMS INTERMESH

(Continued from p. 4)

agronomy, and biology into an applied combination with the social sciences, in an orbit that includes the whole of agriculture and considerable segments of the urban economy as well. Research and action programs must fit together, and come into a dynamic focus on the farm and on the watershed. Also, they must mesh with urban policy.

# The Rehabilitation and Tenancy Programs

By W. W. Alexander<sup>1</sup>



ONE of the most important innovations in the Government's land policy is a more direct concern for the welfare of the people who make their living from the soil.

For more than a century it was possible to follow a land policy which paid no special attention to the people on the land. They could be virtually disregarded so long as a farmer could move to new land in the West when his old farm was exhausted or could readily find work in the cities.

Today, with widespread unemployment and with no more free land capable of producing a decent living the old approach to land problems has become inadequate. It is now generally recognized that any program for the proper conservation and use of our natural resources must consider the people who live on the land as well as the land itself.

Unwise use of the land was largely responsible for the condition of more than a million farm families who were in urgent need of relief during the depths of the depression. Many of these five million people had been ruined by floods or droughts, and all of them had suffered severely from the general business decline; but these were not the sole causes of their difficulties. The great majority were the victims of long-neglected soil erosion, careless and unscientific farming practices, inadequate acreage, insecure tenure, over-burdening debts and a prolonged period of depressed farm prices.

<sup>1</sup> Administrator, Farm Security Administration.

Since it obviously would have been both expensive and demoralizing to carry these families indefinitely on direct relief, the Government has attempted to help them reestablish themselves as self-supporting farmers. This task of rehabilitation was entrusted to the Resettlement Administration, and more recently to its successor the Farm Security Administration.

Many needy families had access to land suitable for farming, but they had failed because they lacked adequate equipment and training in farm management. These two needs the Farm Security Administration has endeavored to supply. Small loans are made to farm families, who cannot obtain credit from any other source, for the purchase of the minimum of equipment required to carry on farming operations. Careful supervision of farm- and home-management plans provides the training and guidance.

Rehabilitation loans finance the purchase of necessary farm supplies, livestock, seed, fertilizer, feed, tools, household equipment and temporary food and clothing requirements. They are repayable over a period of 1 to 5 years and carry a 5-percent interest rate.

Every farmer who accepts a loan agrees to follow a farm- and home-management plan, worked out in cooperation with the county rehabilitation supervisor and based on practices recommended by county agents and Extension Service experts.

A typical farm- and home-management plan calls, first of all, for the raising of enough vegetables and

livestock to meet the family's own subsistence needs. Acreage is set aside for the raising of feed for work animals and other livestock. The rest of the farm ordinarily is devoted to cash crops, which are diversified as much as possible. Throughout the year the rehabilitation supervisor is ready to give the borrower any additional advice he may require, on methods, soil protection, and crop rotation.

If the farmer is hopelessly burdened with debt, a voluntary committee of local citizens helps him to make an adjustment with his creditors, thus enabling him to get on a sounder financial footing.

When the farm is rented the Farm Security Administration tries to secure satisfactory leasing agreements which will give the tenant a sense of security and stability. This is not only desirable in itself, but also decreases the loan risk by assuring sufficient time for the working out of the farm plan.

There is a large group of destitute farmers who could not wisely be given rehabilitation loans, even if money were available. Thousands of families living in drought areas have been refused loans because their land did not contain enough moisture to justify planting a crop. Approximately 58,000 additional families have migrated from the Dust Bowl region to the Northwestern and Pacific Coast States. Many of these have settled on acreages too small or too barren to provide a permanent support. It would defeat the purpose of both the rehabilitation and land-planning programs to extend loans for permanent improvements on land that should not be kept in agricultural use. Under such circumstances and in cases of extreme need, the Farm Security Administration has therefore made subsistence grants rather than rehabilitation loans.

It is now generally recognized that there is an intimate relationship between our system of land tenure and such problems as soil erosion, occupancy of submarginal lands, and progressive impoverishment of the individual and community life.

Tenants with short-term verbal leases have at best a transitory interest in the land they cultivate. They are not penalized for letting the land decline in fertility, nor are they rewarded for any improvements they may make. Such people are likely to regard their farms as a resource to be exploited to the full during their brief occupancy, rather than as homes to be improved and made secure for the future. Unless the farmer has some security on the land, it is difficult, if not impossible, for him to cope with land-use problems.

In the South, particularly, where a live-at-home program and a more diversified type of farming appear

to be desirable, the present system of tenancy stands in the way of improvement.

Today more than two out of every five farmers in the United States are tenant farmers, tilling land they do not own. Their ranks are increasing rapidly, at the rate of about 40,000 a year. One tenant out of every three moves each year. In many areas, the result is a gradual impoverishment of landlords, tenants, and the land itself.

As one approach to the problem, Congress passed the Bankhead-Jones Farm Tenant Act. Title I of this act provides for loans to a limited number of tenants, croppers, and farm laborers for the purchase of their own land. The Farm Security Administration was designated to carry out this program.

Funds have been allotted to each State and Territory on the basis of farm population and the prevalence of farm tenancy. It is estimated that approximately 2,100 loans can be made in about 325 counties with the \$10,000,000 appropriated for this fiscal year.

County committees, consisting of three farmers, certify the applicants who by reason of character, ability, and experience are likely to carry out successfully the undertaking required under a loan to purchase a farm.

Loans are extended to selected farm tenant families for the purchase of a family-size farm. Such a farm in general is not larger than can be handled by the farmer's own labor and that of his family. The farm provides as much productive work as possible and should yield sufficient income to provide for the family on a satisfactory basis and enable the borrower to pay off the loan.

The farms selected are productive, and the productivity will be carefully maintained by a sound farm-management plan. These plans are prepared by the farmer with the help of the county supervisor. The assistance of specialists of the Extension Service, the College of Agriculture, and the experiment stations guarantees that the plans are in accordance with the best agricultural and home-management practices developed in each area.

The basis for the improvement of land use in the rehabilitation and tenancy programs is the farm-management plan, based on the best advice obtainable through county agents and State extension services. Studies made by these experts are applied to the individual farm, and crops best suited to that farm are planted and cultivated scientifically.

The purpose of the farm-management plan is to make the farmer self-sufficient in raising food for his family

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# Water Facilities for the Arid and Semiarid West

By Dillon S. Myer<sup>1</sup> and L. C. Gray<sup>2</sup>

FOR many years the Federal Government has assisted in the development of large works for the use and control of water, but only recently has it given aid in providing small water facilities. Under the emergencies of recent years and the various attempts to relieve them, considerable Federal aid has been expended in the development of small water facilities in parts of the Great Plains. Many small reservoirs were constructed, but there is still need for much additional effort along this line. It is expected that the present program of the Department of Agriculture for the development of water facilities will round out the water-use projects in the arid and semiarid Western States where the low and very irregular precipitation, combined with meager supplies of surface and ground water, constitute a problem that is of paramount importance to agriculture.

The extent of development in these arid and semiarid areas is generally proportionate to the amount of available water. Where irrigation was practicable, stable communities have developed; but the relatively limited water supplies have restricted such development to a small area. The efficient use of the scant supply is, therefore, necessary to the sound use of the other resources of the region.

In much of the semiarid West crop production under dry-land farming conditions is highly uncertain. Years of drought as well as periods when precipitation is above average are not uncommon, and a tendency toward precipitation cycles of irregular duration seems apparent. During the periods of higher rainfall, dry-land crop production flourishes and is pushed farther into drier sections; but when the periods of lower rainfall recur the farmers find themselves in serious difficulties and blame their troubles to the lack of rainfall. Because of lack of stock-watering facilities parts of the range cannot be efficiently used for grazing even in years of average precipitation, and during drier periods the water-supply problem becomes acute.

Small water facilities of several types are needed to promote better land use and to assist in stabilizing agriculture in these arid and semiarid regions. On the range lands springs should be developed, wells should be dug where ground water is available at reasonable depths, and small impounding dams should be con-

structed to create water supplies for livestock. These facilities should be carefully located in order to serve the area adequately while avoiding the duplication of facilities in nearby places. During recent years the programs for construction of small livestock water reservoirs have not always been coordinated or accompanied by careful planning, and as a result many of the reservoirs are not properly serving the purpose for which they were intended.

To increase the amount of available forage in these arid regions, the storm waters and spring run-off from snow melt should be diverted from water courses and spread on pasture and hay lands; this would also aid, to a minor degree, in the mitigation of floods.

Water facilities may be used to assist, to some extent, in the stabilization of dry farming. On some farms adequate water is not available for domestic and livestock purposes. Where ground water is present it may be used as a source, but there are areas in which the supplies must be obtained from surface water. If an ample water supply can be secured, such facilities may be made a little larger so that they may be used for the production of an adequate home garden, a small amount of forage for work stock, and possibly the farmer may be able to keep a milk cow.

The purpose of the land utilization program of the Department of Agriculture under title III of the Farm Tenant Act is to relieve distress among farmers and to demonstrate how lands which are submarginal for their present use may be put to uses to which they are better suited. One of the methods used in the drier areas of the West is Federal purchase of submarginal crop lands and their development for range use. Development includes the provision of necessary livestock water facilities. The construction of water facilities in this program, however, is limited to federally owned lands.

On its demonstration projects and C. C. C. camp areas in the arid and semiarid sections of the country the Soil Conservation Service has included the development of water facilities as an essential part of a coordinated soil- and moisture-conservation program. It has recognized that without this necessary development of water facilities, a balanced farm or ranch program, capable of meeting the economic needs of the operator, would be seriously handicapped if not an actual impossibility over a long period of time. Efforts of this

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<sup>2</sup> Assistant Chief, for land utilization, Bureau of Agricultural Economics.



agency in the direction of better water facilities have been limited, however, to defined areas which do not encompass a majority of the farms and ranches seriously needing this type of assistance.

Federal assistance to individual farmers and ranchers in the development of water facilities on land which is not in Federal ownership has been made possible by the passage of the Pope-Jones Water Facilities Act.<sup>3</sup> As funds are being provided for the program under this act, this assistance will be made available to farmers.

Specifically, the objective of the Pope-Jones Act is " \* \* \* to assist in providing facilities for water storage and utilization in the arid and semiarid areas of the United States." The Secretary of Agriculture is authorized " \* \* \* to formulate and keep current a program of projects for the construction and maintenance in the said [arid and semiarid] areas of ponds, reservoirs, wells, check-dams, pumping installations, and other facilities for water storage or utilization, together with appurtenances to such facilities. The facilities to be included within such program shall be

<sup>3</sup> Public No. 399, 73rd Congress.

located where they will promote the proper utilization of lands and no such facilities shall be located where they will encourage the cultivation of lands which are submarginal and which should be devoted to other uses in the public interest."

These facilities may be located either on federally owned lands or " \* \* \* on any other lands upon obtaining proper consent on the necessary rights or interests in such lands." The land utilization program of the Department of Agriculture is rounded out by this authorization for the construction of water facilities on lands not owned by the Federal Government. From a standpoint of policy this act is especially significant in that it recognizes the relationship between water use and land use in the more arid parts of the country.

Before construction is undertaken in any area, attention will be given to the careful planning of necessary facilities to assure that they will promote better land use and demonstrate coordinated use of land and water resources. A further aim of this program is to provide adequate water facilities at costs commensurate with the benefits to be obtained from them.



## THE REHABILITATION AND TENANCY PROGRAMS

(Continued from p. 15)

and feed for his livestock. This requires a diversified program of garden and feed crops as well as a cash crop, and generally tends to reduce the acreage devoted to cash crops.

Both because of the undesirable effects of insecurity on the tenant and in order to insure the proper working out of the farm plan, the Farm Security Administration encourages written leases for as long a period as practicable for all farmers who receive rehabilitation loans. Only 20 percent of all tenants hold written leases, in contrast with 83 percent of tenants holding such leases who are rehabilitation clients.

This assurance of continued occupancy, with the guidance furnished by county supervisors, has thus far served to promote soil conservation and good land-use practices among rehabilitation borrowers throughout

the country. In the southern Great Plains area, the number of borrowers who adopted strip-cropping increased from 215 in 1935 to 2,381 at the end of 1937. Those who used contouring increased during the same period from 438 to 3,350. The number who have begun terracing their land rose from 85 to 612.

Increase among these families of the number of work animals and livestock owned is additional evidence of improved tenure status and improved farming practices. A recent study of 231,000 borrowers showed that they had doubled their ownership of work animals, and more than tripled the number of subsistence livestock.

The enlargement of the farm units to an economic size is yet another evidence of improved land use. This same study revealed that the average acreage cultivated by clients increased from 80 to 102 acres.

# Flood Control Work of the Department

By Arthur C. Ringland<sup>1</sup>

THE Flood Control Act which was approved June 22, 1936, is the enabling legislation which establishes the Federal policy in relation to a national flood-control program and the principles which are to govern actions of the Secretary of War and the Secretary of Agriculture in carrying out the work authorized. The implications and potentialities of this organic legislation mark it as of extraordinary significance in the field of conservation. It is the culmination of 30 years of effort initiated in Congress in 1907 by the late Senator Francis G. Newlands. To use the words of Secretary Wallace: "It presents to the Department a rather extraordinary opportunity to coordinate the efforts of Federal, State, and local agencies with those of thousands of farmers and other land-owners. The problem is not one of techniques and economics alone, but also one involving fundamental social principles, including new forms of local social control. In fact, the problem is so comprehensive that we must draw upon the experience of many of the bureaus of the Department. I know this experience of coordination will be productive and it may even point the way to a broader application of this principle throughout the Department."

Senator Newlands contended that flood control was a national problem that demanded treatment of the entire river as a unit, from the very springs to the mouth. He emphasized that not only was the construction of levees and storage reservoirs necessary to obstruct the flow of floodwaters but that other devices through "scientific soil cultivation in such a way as to absorb instead of shedding moisture," would have to be employed and that forest areas must be increased to serve as natural reservoirs. To these ends he kept before succeeding Congresses a bill to establish a commission to develop waterways and watersheds for the complete use of water, and to correlate and coordinate all factors relating to flood control.

It was not until 1917 that the Newlands bill was passed and included as section 18 in the River and Harbor Act of August 8. The act was a compromise and provided for the appointment of a commission to be known as the Waterways Commission" \* \* \* to bring into coordination and cooperation the engineering, scientific, and constructive services, bureaus, boards and commissions of the several Governmental

Departments \* \* \* to study development or control of waterways and water resources and subjects related thereto \* \* \* with a view to uniting such services in investigating, with respect to all watersheds in the United States, questions relating to the development, improvement, regulation, and control of navigation \* \* \* including therein the related questions of irrigation, drainage, forestry, arid and swamp land reclamation, clarification of streams, regulation of flow, control of floods, utilization of water power, prevention of soil erosion and waste, storage and conservation of water for agricultural, industrial, municipal, and domestic uses \* \* \* to secure the necessary data, and to formulate a report to Congress \* \* \* a comprehensive plan or plans for the development of waterways and the water resources of the United States \* \* \*."

President Wilson delayed the appointment of the Waterways Commission presumably because of the intervention of the World War. Section 18 of the River and Harbor Act of 1917 was repealed when the Federal Power Commission was created by the act of June 10, 1920.

For many years Federal control measures continued to be largely confined to the construction of levees along the lower reaches of the Mississippi River to confine the overflow of flood waters. Storage reservoirs did not become a factor in national flood control until the passage of the act of May 15, 1928. This legislation directed the War Department to prepare projects for flood control on all tributary streams of the Mississippi River system which were subject to destructive floods. The effect was to be attained by the establishment of a reservoir system in the drainage basins of the tributaries, and the benefits would accrue to navigation and agriculture through the prevention of erosion and silting of the streams.

In a series of reports, the Army Engineers projected a comprehensive flood-control plan involving many reservoirs and some 2,000 projects at an estimated cost of over 8 billion dollars. The reports increased the emphasis placed upon the value of the storage of floodwaters in addition to protection works such as levees and flood walls. The great floods of 1936 in the Connecticut, Susquehanna, Allegheny and Monongahela dramatized the legislative situation in Congress, and in May 1936, the Senate Commerce Committee pre-

<sup>1</sup> Chairman, Flood Control Coordinating Committee.

sented the remarkable flood-control measures which became the Omnibus Flood Control Act of June 22, 1936, and which recognized the complementary relations of biology and engineering in the control of floods.

Essentially, Congress recognizes under this act that the Federal Government in cooperation with the States and their political subdivisions, should undertake investigations and improvements of waterways, including the watersheds thereof, for flood-control purposes, if the benefits are in excess of the estimated costs and if lives and social security are affected. To further those principles Congress has provided that Federal investigations and improvements of waterways shall be prosecuted by the War Department, and that Federal investigations of watersheds and measures for run-off and waterflow retardation, including soil-erosion prevention on watersheds, shall be carried forward by the Department of Agriculture. The preliminary examinations and surveys already authorized, to determine the necessity for control measures and estimates of costs, now include the watersheds of all the major drainage basins of the United States. Under the authority of the Flood Control Act of 1938 further provision is made to correlate the program for the improvement of rivers and other waterways by the War Department with the program for the improvement of watersheds by the Department of Agriculture. Works and measures are now authorized to be prosecuted by the Department of Agriculture on the watersheds of waterways for which engineering works have been adopted and authorized to be prosecuted by the War Department. Moreover, the act of June 11, 1938, making appropriations for civil functions administered by the War Department, includes as part of the funds made available for flood control operations an initial \$4,000,000 for the prosecution of works and measures for run-off and waterflow retardation and soil erosion prevention on the watersheds of flood control projects authorized by law. This will permit the Department to proceed, as soon as survey plans are completed, with control operations upon certain watersheds of high flood hazard such as the Los Angeles, and carry out its work on such projects concurrently with the War Department.

The development of the national flood-control program projected by Congress involves the correlation of the plans of the War Department and of the Department of Agriculture. Economically, a flood-control plan must rest upon the direct benefits which it bestows upon the protected areas. Major engineering flood-control structures such as storage or detention reservoirs, debris basins, flood walls, and levees are immediately operative in the protection afforded to

lives and property. It is therefore a responsibility of the Department of Agriculture to determine the upstream auxiliary measures necessary to complement these downstream engineering works; to increase the effectiveness of the flood-storage capacity of the reservoirs by the retardation of run-off and decrease the rate of siltation; and through the control of tributaries to reduce the shoaling of river channels protected by levees and revetments.

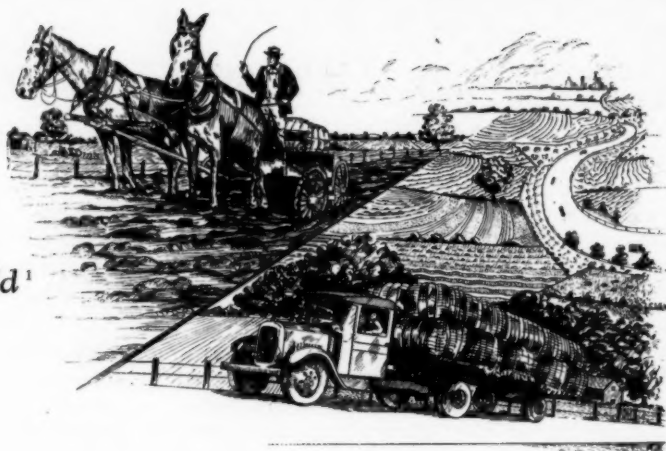
These upstream measures, however, are to be distinguished from the land-use adjustment programs of the Department, although some of the techniques employed may be similar. Upstream flood-control measures are directed to the control of flood flows and the stabilization of soils of headwater areas for the protection of existing values downstream. Land-use programs are directed to the better use of farm, range, and forest soils for the maintenance of a permanent agriculture. Each class of work creates a distinct kind of Federal and local relationship. Each requires a particular organization, distribution of costs, and obligations of maintenance. Each can be integrated to further a common program.

The flood-control program is a coordinated enterprise of a number of bureaus in order to carry out adequately the responsibilities of the Department. Advisory and coordinating committees have been set up to formulate policies, establish procedures, and provide for cooperation and collaboration between bureaus. At the same time coordinating committees have been organized in the field representing the Bureau of Agricultural Economics, the Soil Conservation Service, and the Forest Service, comparable to the Flood Control Coordinating Committee in Washington. Additionally, representatives of other bureaus have named consultants in Washington and in the field to assist these committees.

The task ahead is as vast as is the country, for it may be assumed that the cost of watershed control will equal the cost of waterway improvement. The problem presented is not so much one of techniques of control as it is of organization and finance. The responsibility for upstream control must be discharged adequately and within a reasonable time if effective results are to accrue, and in the case of some watersheds to prevent damage beyond the bounds of economic recovery. These considerations, and Federal and State budgetary limitations, suggest that in addition to appropriations, loans, or local cooperation, other forms of assistance should be considered, including W. P. A. and C. C. C. labor, if upstream control is to be developed concurrently with downstream control and at a cost commensurate with other national obligations.

# Roads to Market

By T. H. MacDonald<sup>1</sup>



IT IS almost self-evident that highway transportation is closely associated with the use of land. In many areas, the highway offers the only means of transportation, while in others it is a very important if not the essential link with other forms of transportation. Consequently, highway development should be closely coordinated with programs for proper land utilization. Highways intended to serve primarily agricultural needs should not be developed in areas which are going out of agriculture or which should be withdrawn from agriculture. Conversely, the highway program may be used in conjunction with other appropriate measures, such as land acquisition, rural zoning, etc., to induce proper use of land: Through the withholding of highway improvements in areas unsuitable for agriculture, and by assisting the development of true agricultural communities through the provision of favorable highway facilities, it is possible to discourage continued use of submarginal lands and to further in no small degree the program of agricultural readjustment.

The Department's highway program has been developed to keep pace with the changing conditions of a transitional period of remarkable transportation development. It may be broadly described as covering three periods, differentiated by the methods used in selecting highway projects.

The first period began in 1893. During the late eighties, the National Grange and the League of American Wheelmen had stirred up sufficient interest in highways to bring about the establishment by Congress of a new office in the Department, the United States Office of Road Inquiry. The Office of Road Inquiry studied road building materials and methods, published reports, and built object-lesson roads, often in cooperation with land-grant colleges

as a phase of the Federal aid granted to such institutions by the Morrell Act.

Before the end of this period, the American automobile industry had begun its phenomenal growth. By 1916 the demands of automobile owners for roads on which they could make longer trips had become a powerful pressure, and rural landowners were urgently demanding better roads to markets.

In 1916 the Federal Aid Road Act was passed. In addition to granting Federal aid, it provided for the organization of State highway departments. It did not, however, prevent expenditure of the appropriations made under it on many disconnected projects. During the next 5 years, which included the War and a tremendous increase in agricultural production and in highway transport, the need for development of a highway system became urgent.

The Highway Act of 1921 provided for the next logical step—the concentration of Federal aid expenditures on through roads and trunk lines not exceeding 7 percent of the road mileage in any State. It immediately became obvious that the first essential in developing a system of highways was a framework upon which the structure could be built, and thus began the period of selection. It was not difficult for the States to select the most important through routes; an intelligent study of the map was all that was required.

As the task of connecting all the States and their important centers was carried forward, other economic changes appeared on the horizon. One of these was wide-spread hand-to-mouth buying, which rapidly replaced the old system wherein business houses had carried large stocks. As new highways augmented the transportation net, other marketing practices changed also. Rural landowners—as for example, cotton growers operating trucks—could hold their crops

<sup>1</sup> Chief, Bureau of Public Roads.



for a favorable price and still get them to market in time to realize a suitable return. The farmer's neighborhood grew larger, as did the area in which he could market his crop, and the more he enjoyed the benefit of roads, the more urgent became his demand for extension of Federal aid to so-called farm-to-market roads.

By 1935, the Federal highway system was practically complete in its first development. Every important center in the country had been tied into the net, which in the more prosperous and densely populated States had been woven closer with State roads. The pressure from rural landowners for better roads to market was still increasing. The necessity for relief for unemployment growing out of the depression required the expenditure of Federal funds, and provision was made, for the first time, through the Hayden-Cartwright Act, for expenditures from such funds on secondary roads. The selection was to be made from 2 million miles of local roads. Little was known as to the condition of these local roads, and it was apparent that a thorough fact-finding survey would have to be conducted before it would be possible to select from this vast mileage the roads which should be added to the State highway systems. This necessity had been recognized by the Congress in the Hayden-Cartwright Act of 1934, which authorized the use of 1½ percent of the Federal-aid highway funds for such surveys. Under this pro-

vision, the highway departments of 43 States are now cooperating with the Bureau of Public Roads in a series of comprehensive state-wide highway planning surveys.

Other reasons existed also for the state-wide highway planning surveys, which began in 1935 and opened the period of scientific selection. The volume and type of highway traffic had been changing since 1921. Vehicles were heavier and faster, and there were a great many more of them. Highways satisfactory for the speeds of 15 years ago are hazardous today, and there is consequently the problem of reconstructing and modernizing a large mileage of the primary system. In the consideration of a secondary system, therefore, one of the most important problems is the financial problem. A determination must be made of the total amount necessary to improve a logical and needed mileage of local roads, and at the same time to protect the investment already made in the primary system.

It is in the selection of the secondary or local road system that the Department's highway program can be of greatest assistance to, and receive the greatest benefit from, other land-use programs of the Department. The Bureau of Public Roads, and in fact all highway builders, will be vitally interested in a coordinated series of land-use or land-classification studies.

#### ECOLOGY OF MIXED PRAIRIE IN WEST CENTRAL KANSAS. By F. W. Albertson. University of Nebraska. October 1937.

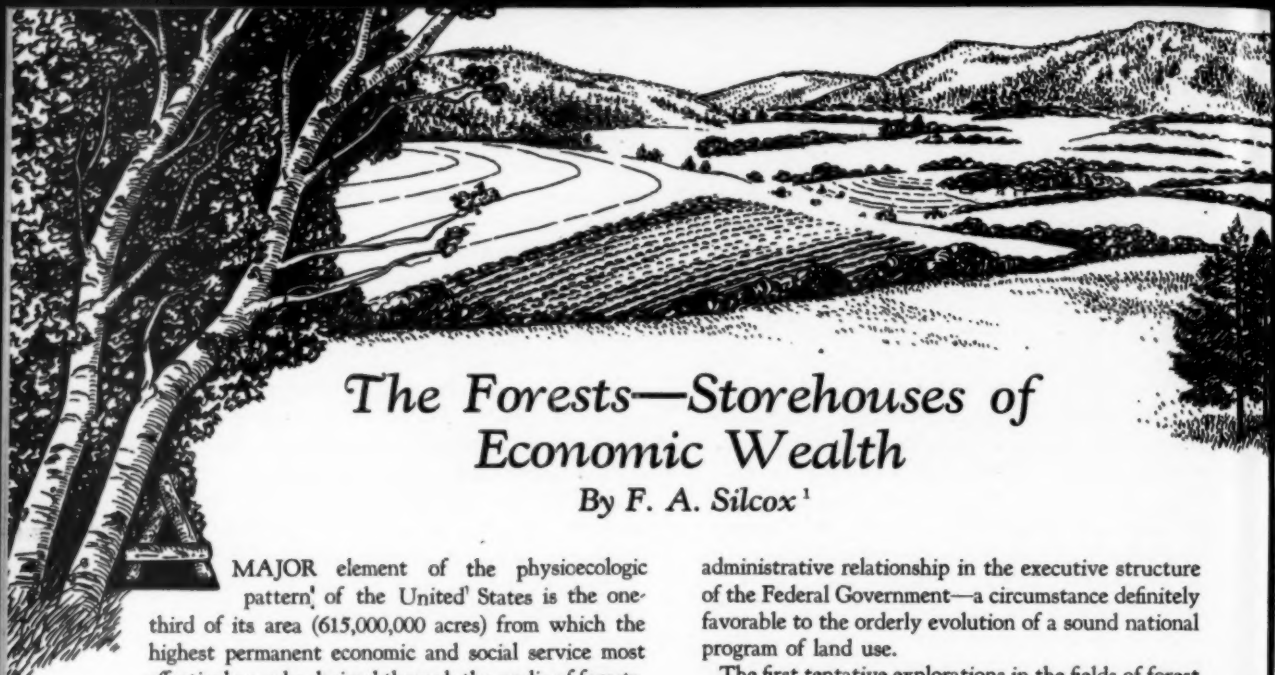
The mixed prairie treated in this work as a distinct plant association occupies a broad belt across the western half of Kansas where the topography is rolling and precipitation is extremely variable. Because of its proximity to the Dust Bowl, the area holds much interest for the conservationist and this study, which supplements the investigations of Weaver and Clements, Pool, Bruner, Shantz, Aldous, Schaffner, and others on grassland associations and environment, will be welcomed by all who realize that ecological studies are necessary for a true understanding of plains and prairie problems.

The research from which data were assembled was concerned with the detailed structure of several types of mixed-prairie grassland, the reasons for their distribution, interrelations of the plants both above and below ground, and measurements of the soil and aerial environmental factors. The unit area studied comprises 750 acres of land which since 1900 has been fenced and only lightly grazed. The field studies were made during a 3-year drought period. Climate and soils are described, and results of run-off, percolation and evaporation investigations in the short grass, little bluestem and big bluestem habitats are given introductory to the main problem involving the plant community relationships.

The studies on the vegetation have an especial value as pointing out the shifts in plant populations with varying precipitation

and soil-moisture supplies, and the relationship between depth of rooting and resistance to drought among several related species. It was found that *Bulbilis dactyloides* and *Bouteloua gracilis* comprise about 80 percent of the short-grass cover, with early spring growth producing a dense sod, and early blossoming and fruiting. There is rapid recovery after drought, with buffalo grass leading in the reclaiming of bared areas from which certain native forbs entirely disappeared. Root penetration of buffalo grass and blue grama was found to be about 5 feet. In the little bluestem areas, on the steep hillsides, *Andropogon scoparius* is the dominant species; and here "a greater number of species and better developed societies of forbs occur . . . than in either the drier short-grass habitat or the less xeric lowland dominated by tall sod-forming grasses." In the little bluestem habitat the dominant species and certain other grasses have root penetration of three or more feet, while some of the long-lived forbs extend their roots 4 to 6 feet into the soil of south slopes and 6 to 12 feet in deeper soils of north-facing slopes. In depressions well supplied with moisture, *Andropogon furcatus* is the dominant species, and with other sod-forming grasses it forms an almost continuous cover. During the drought period *Agropyron smithii* increased greatly in the big bluestem community.

The grasses and forbs constituting the three principal communities are listed in three separate tables, and excellent drawings show quadrat findings. Drawings illustrating growth below ground of many of the plants are included, and these are most illuminating in connection with the discussions of ecological relationships in the separate communities.—P. O'N. F.



## The Forests—Storehouses of Economic Wealth

By F. A. Silcox<sup>1</sup>

MAJOR element of the physioecologic pattern<sup>1</sup> of the United States is the one-third of its area (615,000,000 acres) from which the highest permanent economic and social service most effectively can be derived through the media of forests. They are vital parts of the complex mechanism of nature—essential factors in the processes through which is maintained the ecological equilibrium to which the American people have adapted their cultures, their social and industrial economies and, particularly, their agricultural techniques. Agriculture is dependent upon favorable climatic influences, stability of stream flow, retardation of abnormal soil movement, readily obtainable and inexpensive supplies of fuel and building materials, local markets for farm products created by local industrial development, markets for surplus farm labor and equipment through the conversion of raw materials into commodities of utility and commerce. To all of these needs of agriculture the forests of the United States make large and definite contributions. Opinions may vary as to the exact measure of these contributions, but it is an indubitable fact that even in their minimum proportions they collectively influence much of the agricultural economy of the Nation.


Thus it was logical that the first Federal agent appointed to study forest conditions in the United States, in 1876, should be employed in the Department of Agriculture; that the Division of Forestry organized in 1881 should have been a unit of that Department; that the more pretentious Bureau of Forestry created in 1901 should continue in that Department; that the administration of all the national forests should be assigned to it in 1905. The intimacy of relationship between farming and forestry, which exists in fact, fortunately has been paralleled by

administrative relationship in the executive structure of the Federal Government—a circumstance definitely favorable to the orderly evolution of a sound national program of land use.

The first tentative explorations in the fields of forest biology and economy disclosed trends which, if allowed to continue unchecked, threatened eventually to have an adverse effect upon the national welfare. At that time, the United States still possessed a tremendous acreage of virgin forest land. Hence, a logical initial step was to safeguard the public interest in those properties by the passage of the act of March 3, 1891, which authorized the withdrawal of public lands as forest reserves, later to be known as national forests. Constructive basic principles for the permanent management of these public properties were developed in the act of June 4, 1897. To both of these movements the Department of Agriculture made large contributions, but because the lands were parts of the public domain their administration was vested in the Department of the Interior. The technical and scientific aspects of forestry were functions of the Department of Agriculture. In recognition of the inseparability of the two functions, Congress, by the act of February 1, 1905, consolidated them in the Department of Agriculture.

Due to its initial impetus, the development of a Federal system of public forests has progressed with marked success. While reservations of public lands largely met the situation in the Western States, it failed to meet the urgent requirements in the States in which the public domain largely or wholly had passed to private or State ownership. A policy of acquiring forest lands by purchase consequently was inaugurated by the act of March 1, 1911, and extended by the act of June 7, 1924. Through these various developments there now exists, distributed throughout 38 of the States, Alaska, and Puerto Rico, a system

<sup>1</sup> Chief, Forest Service.



of national forests comprising 157 units of administration. Their boundaries embrace a gross area of 226,621,123 acres, of which 174,405,397 acres are owned or in course of acquisition by the United States. Of the total land area of the 48 States, 8 percent is now national-forest land, and the entire acreage within the forest boundaries benefits from their protection, development, and management.

These national forests are administered under the principles of balanced and controlled utilization, through which they serve a wide array of social, industrial, and economic needs. Several specific types of service may be enjoyed simultaneously or consecutively, from the same lands. Through restoration of optimum forests and vegetative covers there is derived concurrently with timber production the stabilization of run-off, retardation of abnormal soil movement, forage production, conditions favorable to the propagation of wildlife, wide opportunity for outdoor forms of recreation.

These vast storehouses of economic wealth are in active use. From them is cut the equivalent of more than one billion board feet of timber each year, yielding revenues of \$2,500,000 to \$3,000,000. Cattle and horses numbering more than 1,300,000 head, sheep numbering 5,637,000, plus their young, are grazed by 26,000 permittees who pay the Government over \$1,500,000 yearly. More than 1½ million game animals find their habitat in the national forests. Over 60,000 miles of stream produce fish. More than 40,000 areas are occupied under permit for purposes of industry, commerce, recreation, and public service from which annual revenues exceed \$400,000. From the watersheds of the national forests hundreds of cities, towns, and irrigation districts draw much or all of the water supplies vital to their existence. These uses represent not the substance but the increment; they are not ephemeral but indefinitely repeatable.

The nature and distribution of the national forests brings them into a certain coincidence with the majority of the farming regions which are preponderantly submarginal, but from which flows the youth that makes up the deficiencies of urban populations. Within or adjacent to the national forests are several hundred thousand families whose economic destinies are linked with the depleted soils and resources resulting from decades of natural resource exploitation. These people cannot be transplanted to other locations; their economic salvation lies in their rehabilitation in their present locations. Part of the program of rehabilitation is economic: it involves the restoration of industries through replacement of natural resources, the development of credit facilities, and the organization of marketing arrangements. Part is the rehabilitation of the home—a sanitary rather than a polluted water

supply, a tight roof rather than a leaky one, firm foundations instead of rotting sills. Part is a matter of education through Extension Service leadership.

In these circumstances, national-forest management is not a relatively restricted function of natural resource production and utilization, but rather a widely ramified process of economic and social planning in which the human factors largely are dominant. Management as a foundation for acceptable ways of life for dependent people, in fact as means of life, is the paramount objective of national-forest administration. Early recognition of this ideal inspired the first notable example of large-scale planning of nonurban land uses. Only by careful planning and correlation could the protection of the forests, the structure of physical improvements essential to their effective use, the adjustment of competitive economic demands for the industrial use of their material resources, the provision for wildlife, the safeguarding of esthetic, inspirational and scenic qualities, all be harmonized into mutually compatible patterns. Thus it happened that, of sheer necessity, the Forest Service was the first of the Federal agencies to give widespread application to principles of planned land use. Such planning is never static; it is a continuing process requiring constant readjustment.

In not only public but also private forest management, the fundamental need is for scientifically determined knowledge as the basis for both planning and action. A second major field is therefore that of forest research, which in itself constitutes a current action program of vast proportions.

The areas of forest land in private and State ownership occupy a leading position in the country's forest ownership pattern because of their location, values, and productivity. They comprise more than 70 percent of the country's forest area. They contain the best four-fifths of the commercial forest lands and the best three-fifths of the present commercial sawtimber stand. About 98 percent of all forest products are now cut from them and nine-tenths of all potential forest growth is on them.

The forest drain exceeded forest growth by about two to one in all sizes and about five to one in sawtimber sizes from 1925 to 1929. It is not now so great, but the actual and potential economic loss has been staggering, and the observance of social values largely neglected. Uncontrolled and wasteful utilization practices that do not contribute to economic and social stability are detrimental to the public interest. The handling of wood as a crop is paramount, the conservation and perpetuation of the forest resource mandatory if we are to have a continuous supply of needed forest products. Other uses, as for recreation, flood and erosion control, etc., naturally follow.



The Forest Service, as the acknowledged Federal leader in continuously productive use of forest land, has established working relations with forest producing agencies, and has carried on the work of developing a unified approach to the solution of the problem. Critical cases have been analyzed, recommendations made to interested public agencies, landowners and industries, and steps taken to secure remedial action. Working in harmony with cooperating governmental agencies, State forestry agencies, and representatives of the wood-producing and wood-using industries, plans have been laid, and in some cases placed in operation, to secure and study the data essential to presentation of the full-vision picture of forest-land use, for the various economic operating areas and for certain States as a whole. Preliminary records indicate that some 37 million acres of industrially owned forest lands are now under some form of forest management, of which from one-fifth to one-fourth may be considered under sustained yield.

The pulpwood situation in the Southern States has presented a definite and categorical example of Federal leadership in safeguarding the public's interest in the forest resource. Unprecedented expansion in the kraft industry, the influx of more than 100 million dollars in increased pulp-industry investments in that area, with the attendant threat of despoliation and devastation, made it imperative that cautionary action be taken. Cooperating with the Forest Service the southern division of the American Pulpwood Association is engaged in a program of self-regulation which it is hoped may lead to a dual goal of protecting the industry's investment and the stabilized production of the timber crop, a major portion of which comes from the farm woodlands of the South.

Forestry on the farm has also reached the cross roads. Closely integrated with agriculture, the tree crop gives to the farmer an opportunity to receive periodic financial dividends from the poorer portions of his farmland. A continuously productive stand of timber on his hillsides and poorer soils is a "back-log" of security, and a major factor in the stabilization of his farm life. The Forest Service has long recognized the importance of the forest crop on farms and of the need for a source of reasonably priced forest planting stock for woodlot, windbreak and reforestation plantings on farms, and has been cooperating since 1926 with the States and Territories, under section 4 of the Clarke-McNary Law, in the production and distribution of trees for such plantings. During 1937, 42 States and Territories cooperated in furnishing a total of 41,698,016 trees to farmers under this program alone, the trees being made available for the most part at a price slightly below the cost of production or procurement.

The trees furnished under the Clarke-McNary program meet only a fractional part of the farmers' demands. The expansion of the pulpwood industry

in the South and the resulting trend from a cotton to a wood economy in that region is reflected by a tremendous increase in demands for suitable planting stock.

The acute southern situation, coupled with others equally as important but possibly less dramatic in other sections of the country, resulted in the enactment, by the Seventy-fifth Congress, of the Norris-Doxey law, known as the Cooperative Farm Forestry Act. Vitalization of this law through appropriations will bring expanded programs of planting stock production to help meet the large unfilled farmer demand, and educational and service programs to assist farmers in the management of their forest plantations and woodlands. In harvesting their tree crops farmers need information and guidance in formulating plans for the efficient operation of their farmwoods so that cutting may be done lightly and frequently to provide steady income and to keep the land in continuous production. Much study has been and is being given to the adaptability of farm cooperatives in this field.

The need for large-scale field protective plantings in the prairie-plains region which would protect crops from being blasted by critical hot winds, protect livestock and keep light soils from blowing, was emphasized by recent severe drought conditions. Shelterbelt plantings of trees were first established under the plains-shelterbelt project, created by Presidential Executive order, and these have served to demonstrate the feasibility of such a solution to the problem. Since July 1, 1936, the field protective plantings in this region, established cooperatively with individual farmers, have been carried on as a work relief project. Approximately 44 million trees were planted up to October 1, 1937, of which about 70 percent are established and growing. Nearly 40,000,000 more have been planted this spring. Many of the trees, less than 3 years in the field, are over 25 feet tall, and 1935 plantings are already creating barriers which tame the winds that blow unrestrainedly across unprotected fields.

Continuous progress has been made in cooperative forest-fire prevention work, carried on cooperatively with the State forestry agencies in the individual States under section 2 of the Clarke-McNary law. Thirty-nine States and one Territory are actively participating in the program, with some degree of organized protection given to more than 250 million acres of State and privately owned forest land, resulting in only 1.07 percent of the protected area being burned over in 1936.

The need for increased State ownership of forest areas has been recognized by the passage of the Fulmer Act, authorizing purchase of forest lands for administration as State forests, and the program of management of resettlement areas, many of which have been transferred to State forestry agencies for administration.



# The Land and the Birds and Animals

By Ira N. Gabrielson<sup>1</sup>



THE greatest present need of American wildlife is for land. Any successful restoration program is fundamentally one of land utilization. Wildlife flourished on the North American Continent until the white settlers began to appropriate its native ranges. Although the aborigines lived principally on fish, game, and uncultivated native plants, they never caused any permanent injury to the resource. This was because their simple agricultural operations did not influence natural water levels and did not change or destroy the natural vegetation that provided food and cover for the wild creatures and also protected the soil. The white race, impelled by the necessity to increase food supplies for the support of a much larger population, began at once the exploitation of the soil, with results disastrous to wildlife and in many instances to the human population as well.

The wildlife restoration program of the Biological Survey takes into account the obvious fact that not all forms of wildlife can ever by any possible means be restored to primitive abundance. It does assume, however, that the resource can be greatly increased beyond the existing supply by the application of a sound policy of land utilization, and that the establishment of refuges need not interfere with agricultural development.

The existing national wildlife refuges fall into three general classes: (1) Waterfowl or general wildlife

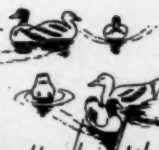
refuges; (2) big-game refuges, preserves, or ranges; and (3) special refuges, or rookeries, for colonial non-game birds.

At the present time some 11,500,000 acres of land have been withdrawn by one means or another for the purposes of increasing valuable forms of wildlife. A major part of this total acreage is made up of lands that are submarginal in character. On much of it agricultural enterprises have been undertaken in the past, with little or no success but with definite injury to the soil and its protective covering. Drainage operations have damaged water levels not only locally but over wide areas of adjacent land. Soil erosion has occurred also as a direct result of this misuse. Many other evils of which we now complain spring from the same cause. Although the work of improving and restoring the areas now included in the Biological Survey's projects is still far from complete, it has progressed far enough to indicate that the policy is sound and feasible in every aspect.

When an area has been acquired, the administrator's first concern generally is to repair the natural hydraulic system and restore or raise the original water levels. This is in line with the efforts of every agency, Federal or otherwise, that is engaged in the conservation of the organic resources of the land—the soil itself and all its products. It represents a complete reversal of an earlier determination to get water off the land as completely and as expeditiously as possible. Hydraulic engineers are now concerned with finding means to keep water on the land and retard the run-off and drainage whenever possible.

Following the restoration of the water resources of an area an effort is made to regenerate the original vegetative cover. Where the vegetation has disappeared the area is replanted, and in many instances additional food and cover plants are introduced. Much

<sup>1</sup> Chief, Bureau of Biological Survey.



of this vegetation is of types that do not require a highly fertile soil. Many plant species that are valuable as soil binders, and also supply food and cover for wildlife, can be grown upon land too poor to yield a profit from any agricultural crop.



It will be noted that the operations just described are identical with the practices recommended by the Soil Conservation Service for projects having to do with the restoration of submarginal lands and the prevention of erosion. There are few, if any, instances where the work of the Soil Conservation Service has not produced conditions highly beneficial to the various forms of wildlife; and there is no single instance where the Biological Survey in carrying out the waterfowl restoration program has failed to promote the soil conservation program as well as its own. Even though there had been an unimaginable state of hostility and lack of sympathy between the Biological Survey and other land-utilization services of the Department, many of the benefits accruing to one service as a result of the operations of another could scarcely be prevented. Since on the contrary there is manifest among these agencies the warmest sympathy and willingness to cooperate, all programs have profited to the fullest extent possible.

While the Survey cannot ignore any opportunity to obtain large areas for restoration, preferably those that have been drained, it is none the less interested in regenerating any area, large or small, particularly in the North Central States. The Survey has received a great deal of cooperation from various Federal agencies and from some State agencies in improving small water-restoration areas. The Soil Conservation Service has built hundreds of small reservoirs and ponds; others have been built by the Forest Service and the Interior Department's Grazing Service; and the Biological Survey itself has constructed a great many. Where these can be fenced and protected from livestock trampling, every small reservoir and dam becomes a fine duck-nesting area, and every little pool produces one or more broods of birds. It seems to be a good practice to fence these ponds and allow the stock to drink from troughs, or to fence lanes into the water, rather than needlessly to allow the destruction of the vegetation.

The easement refuges represent an interesting development in the Great Plains drought area. Here the

Biological Survey has obtained permanent easements from the farmers, which give the Bureau the right to flood the land and maintain each area as a migratory waterfowl refuge. In return for that the Survey does the work of restoring the water level and in most cases allows stock access to the water by one means or another. In North Dakota alone some 120,000 to 130,000 acres of land have thus been obtained, and the restoration of water levels is well under way. The easement program has since been extended to other States. It is one way of enabling the Government to develop minor wildlife areas at low cost.



The Survey believes that the principal and perhaps the only Federal responsibility toward nonmigratory and big-game species is to provide, within their natural ranges, Federal refuges for seed stock for every major North American wildlife species. From these reserves stocks may be drawn to restore the species in sections from which they have been extirpated. With the addition of three areas now under consideration, and a few others in the West for more specialized purposes, the big-game problem in the regions will be less urgent. In the Mississippi Valley there is no Federal big-game preserve, and it is desirable that the native ecological types be protected by restoring habitat and stock in at least one or two places.



It is estimated that about 7,500,000 acres of marshland, properly distributed throughout the breeding and wintering grounds in the United States, are needed to meet the minimum essential requirements of the migratory waterfowl. At the present time about 3 million acres are required to complete this part of the Survey's program.

The Pittman-Robertson Act, passed by the Seventy-fifth Congress, will in time have much influence in solving land-utilization problems in ways beneficial to wildlife, to forestry and to soil and water conservation. The act, also known by the descriptive title—Federal Aid to Wildlife Restoration Act—authorizes the appropriation annually of funds equal to the sums received from the 10-percent excise on arms and ammu-

(Continued on p. 28)



## BOOK REVIEWS AND ABSTRACTS

By Phoebe O'Neill Faris



**CONSERVING CORN BELT SOIL.** By Glenn K. Rule. In Collaboration with Subject-Matter Specialists of the Soil Conservation Service. U. S.

Department of Agriculture Farmers' Bulletin 1795. November 1937.

In this well-constructed and lucid discussion Mr. Rule shows the cause and extent of productivity decline through soil and humus losses over 70 years of continuous cropping in the Corn Belt, and what can be and is being done to check such losses. Judging from the data given, this great area, 8 percent of the total United States, producing one-fourth of the cattle, one-third of the horses, two-thirds of the corn, with a surplus of meat and milk, must be so treated in the immediate future that further destruction will be prevented while at the same time operators may have subsistence from the land. Extending into four regions of the Soil Conservation Service, the area is of profound importance to conservationists if farmer and consumer interests are to be safeguarded through ever-normal production.

Some especially apt examples are given, among them the story of humus depletion under 40 years of drainage and cropping in the Old Black Swamp area in northwestern Ohio. Data from erosion experiments carried out at different stations throughout the Corn Belt show that leaching, humus depletion, and erosion in the region are due to cultivation of unprotected slopes in areas of intense rainfall, crop removal through marketing of plant and livestock produce in areas of fine-textured soils or soils with impervious subsoils, and denudation in those areas which are subject to wind erosion.

To prevent further decline in productivity in the Corn Belt the following recommendations are offered: Retire more erodible land to grass and timber; less corn, more sod crops and legumes; pastures for income; woodlots for income; soil conservation methods applied wherever needed to stop erosion and humus depletion of tillable land.

Better cropping systems are urged for the Corn Belt. "Probably the most important single step that Corn Belt farmers can employ in erosion control is to establish and maintain a satisfactory rotation of crops." It is suggested, however, that complementary treatments be applied—limestone applications to grow legumes for the correction of acid soils, the use of contour farming, grassed waterways, and strip cropping with the thick-growing crop below the row crop. An interesting chart shows how strip cropping may be started in a slightly sloping field. Buffer strip cropping is stressed as having marked possibilities for erosion control in the Corn Belt; it is suggested that permanent meadow strips 18 to 20 feet wide between strips of corn or other crop may be effective in preventing soil washing and at the same time mitigate damage from chinch-bug infestation, grasshopper attacks or damage to corn from hot winds. For cover crops in the vast Corn Belt area, rye, winter wheat, winter barley, and clovers and vetch are recommended, and Korean lespedeza where it is adapted.

Terracing for cultivation on 8- to 12-percent slopes in the Corn Belt is treated in some detail, with specifications for grade of terrace, spacing between terraces, construction and maintenance of adequate terrace outlets, and maintenance repairs. The proper procedure for plowing terraced land is described and illustrated by a drawing.

Mr. Rule states that in the Corn Belt, as elsewhere, prompt action against gullying, both preventive and remedial, is badly needed. Erosion control is of course the approved preventive measure; and to stop incipient gullying—sod bag dams, brush or loose rock dams, grassed waterways (with water diverted while seeding is being done.) In the control of large gullies in the area, diversion ditches should be provided to carry the water around the head, steep banks should be sloped, good soil should be thrown in, temporary structures of wire, post, rock, or log should be built to obstruct flow and catch soil, and then revegetation. For Corn Belt gullies, bluegrass, brome, Reed canary are suggested, while among the favored trees are green ash and white ash, black locust, the oaks, spruces and pines; and wild plum, bush dogwood, grape, wild cherry, haws, and coral berry among the shrubs. Black locust is pointed out as particularly advantageous because of its extensive root system, because it is a legume and adds nitrogen to the soil, because it promotes the growth of grass, and because its growth is so rapid as to produce posts in 10 to 15 years. Although black locust tends to spread, it can be checked by surrounding it with other tree species.

Permanent pasture improvement is stressed as important in the Corn Belt and recommendations are given for liming sour pasture soils and for controlling grub in infested upland pastures. Improvement of grazed and burned woodlands is urged also—keep out the livestock, prevent fire, employ thinning and planting where needed.

In the final section of his bulletin, under the heading "Joined Forces to Hold Soil," Mr. Rule presents brief descriptions of the West Tarkio River project, the Indian Creek project, and a single typical farm of each as rearranged provide for erosion control. As examples of the coordinated application of numerous soil conservation measures through farmer cooperation with the Service, these project outlines are particularly pointed and appropriate.

**GERMAN FORESTRY.** By Franz Heske. Yale University and Oxford University. 1938.

Here is a book that was written especially for those of us in the United States who are concerned with the curbing of forest exploitation and are looking forward to a national economy of land occupation and use which will eliminate in so far as possible the destruction of the land's productive capacity. One of the best features of the large volume is the historical interpretation of forest problems: it is most satisfying to the reader to know how through the centuries it all came about—the artificiality of forest growth in present-day German States, the shifting of species to suit economic conditions, the extermination of many other species, and finally the highly systematized development wherein all forms of land ownership favor the sustained-yield of forests necessary to the life of a country whose policy is population increase and whose land area already is inadequate.

Dr. Heske tells the story well and with detail, using appropriate and carefully prepared data to show the effect of various types of ownership upon improvement and depletion of forests on lands occupied by the German people for many centuries. From the first great clearings more than a thousand years ago, with creeping destruction about the settlements in mountainous regions, through the crucial period leading up to wood famine crises and



## BOOK REVIEWS AND ABSTRACTS

Continued



subsequent restrictions and regulating laws—the beginning of silviculture—we are told of the struggle for a sustained-yield forest management policy which today cherishes the soil and the very life of Germany.

Many scientists and economists are of the opinion that in spite of great differences, inherent and environmental, between the United States and Germany, there are important lessons to be learned by the former from the latter's experiences in forestry, especially those of the past century. Dr. Heske warns particularly against the danger of slipping into schematic forms of forest structure during the transition from virgin forests, or from forests which have been subject to unrestricted exploitation to forests under sustained-yield management. Extensive monocultural plantings of industrial timber species, during the past 50 years, in many parts of Germany, proved beyond dispute the importance of the biologic factor in the health of the continuous forests. "Sooner or later," we are told by the author, "they [even-aged plantings of single species] showed serious defects, such as soil deterioration and decreased rate of growth, lessened resistance to animal and plant parasites, and increased liability to injuries from snow, hoarfrost, and wind." While in the beginning such growth was profitable in money income, it was found that in the long run it did not pay and was in direct opposition to the ideal of sustained management in accordance with the long-time interests of the people as a whole. It is to the work and writings of Johann Christian Karl Gayer, leader of the Back to Nature school of thought, that Dr. Heske attributes the development during recent decades of the naturally functioning and harmonious forest entity.

And fortunate it is for Germany that Karl Gayer lived and that his school of thought was taken up by others and carried forward to form the principal foundations of modern forest management in the German States. As expressed by Dr. Heske, the ideal demands " . . . that the forest be treated in accordance with biological laws, i. e.; mixed forest instead of the schematic culture of pure stands; retention of the soil-improving broadleaf species, especially beech; natural regeneration instead of clear-cutting with artificial seeding and planting; and uneven-aged form of forest in place of the forest composed of schematically arranged even-aged stands." It is of the area, distribution, and composition of present-day German cultivated forests that the main body of Dr. Heske's book treats. Species distribution is described by regions; and the many types of forest ownership, with their economic aspects, are traced throughout the centuries, from the communal woods of very early days to the present time. A very thorough analysis of forest management policies is included, showing the advantages and disadvantages of the many principles involved—size of acreage, ownership, entailment, jurisdiction, the structure of the sustained-yield forest, products of forests, employment in forests and associated industries.

Under the heading Indirect Benefits of the Forest is to be found a most interesting discussion of forests and the microclimate and the significance of new investigations in this subject in clarifying future forest policies. In this connection also are included historical analyses of forests and water supplies, the cultural value of forests, the chase, and the importance of the natural treatment of every forest in the land rather than the segregation of special wilderness areas for the satisfaction of the cultural and aesthetic ideal.

The second part of the book swings directly into a detailed description of the organization of German forestry of the present day. The functions of the various agencies and chief forestry agents are explained as to technical and economic policies. A chapter is given over to the problems of forestry science, ecological and silvicultural, and herein are listed the existing research institutions and forest experiment stations which carry on continuous studies relating to the many phases of the growth, production, and utilization of the forests of Germany. Courses in forestry as found in German schools are discussed with regard to advantages and disadvantages, and the forest as a practical object lesson is emphasized as necessary to an adequate comprehension of the principles and problems of sustained-yield management.

The final 10 chapters of Dr. Heske's book constitutes an analysis of the basic economic and political conditions of Germany as affecting forest management and production. These chapters contain discussions of recent labor legislation, tenure, forest rights, population adjustment, State restrictions, national forest laws, forest taxation, forest fire insurance, forest credits and the special function of timber industry banks, forest reserve funds and the afforestation program. In these chapters are many passages to arrest the attention of American readers: for example, Dr. Heske presents in no uncertain terms his arguments in favor of diversity in forest ownership, in favor of freedom in scientific research, regarding the rights of users in public forests, and the limits to operating regulations for effective results in private forests.

### LAND, BIRDS AND ANIMALS

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tion which is to be used in accordance with other provisions of the law. This amounts to about \$3,000,000 each year.

The act provides for the allotment of these funds to the State conservation commissions to assist in the development of wildlife restoration projects. These projects must have the approval of the Secretary of Agriculture before Federal aid can be given, and the participating States must contribute 25 percent of the total cost of the work. The act is so drawn as to encourage the development of plans involving research work and particularly the acquisition, reclamation, and improvement of lands by the States. Provided that the appropriations are made as authorized, it is evident that over a period of years this legislation will have very great effectiveness in achieving the objectives of the land-utilization program. It will have application particularly to desirable smaller areas of submarginal and wilderness lands which, because of their limited acreages, are difficult to acquire and too expensive to permit of direct administration by the Biological Survey.